

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
18 September 2003 (18.09.2003)

PCT

(10) International Publication Number
WO 03/077087 A2

(51) International Patent Classification⁷: **G06F 1/16**

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(21) International Application Number: PCT/IB03/00929

(22) International Filing Date: 10 March 2003 (10.03.2003)

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(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
102 11 002.6 13 March 2002 (13.03.2002) DE

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(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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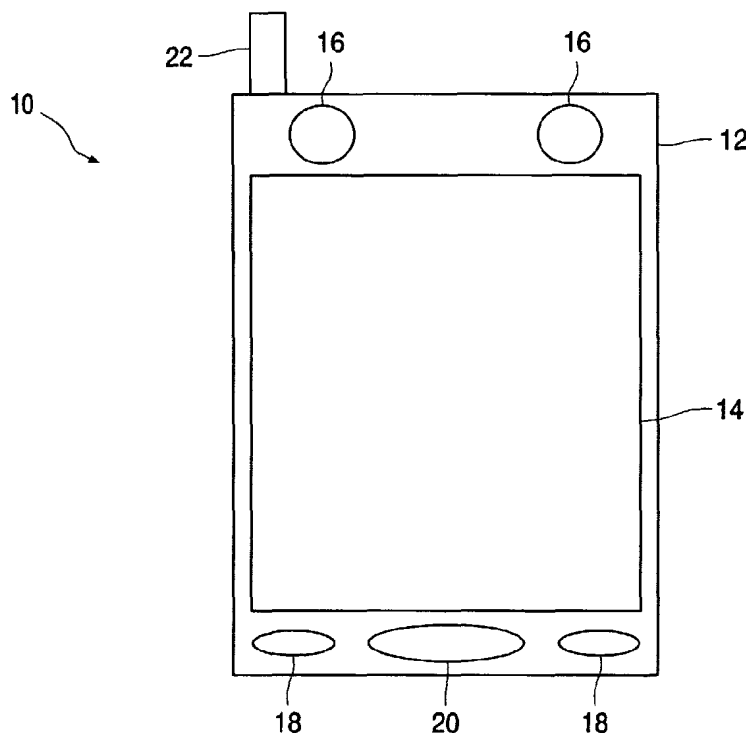
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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[Continued on next page]

(54) Title: PORTABLE ELECTRONIC DEVICE HAVING MEANS FOR REGISTERING ITS ARRANGEMENT IN SPACE



(57) Abstract: A portable electronic device (10) and a method of controlling a portable electronic device (10) are described. The electronic device (10) comprises position sensors to enable it to determine its arrangement in space. The device (10) can be operated in different modes of operation, such as a mobile telephone or a PDA, for example. By changing the spatial arrangement of the device (10), a switch is made between different modes of operation, with, for example, the upright position activating the mobile telephone mode and the horizontal position the PDA mode. The switch between different modes of operation by means of a change in position/orientation allows the user to operate the device (10) intuitively.



WO 03/077087 A2



Published:

— without international search report and to be republished
upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Portable electronic device having means for registering its arrangement in space

The invention relates to a portable electronic device and a method of controlling a portable electronic device.

There are a large number of known portable electronic devices, including microcomputers such as PDAs (personal digital assistants) or organizers, and, for example, mobile telephones, music players, portable miniature televisions, etc. Portable devices are notable for the fact that they are easy for the user to carry from the point of view of size and weight, and that they are able to operate substantially without any fixed direct connection to power supply systems or data networks.

Depending on their nature, the devices contain different components in this case. In the housing, there is a power supply unit, such as a storage battery for example, and usually an electronic control unit, which in most cases comprises one or more microprocessors. The devices are able to acquire user inputs and themselves to put out signals that are, for example, visual or acoustic. Depending on the function performed by the device, the means for acquiring user inputs comprise, for example, microphones, keyboards, and touch screens, and the output units employed comprise, for example, loudspeakers and visual indicator and display means that, depending on requirements, may range from simple lights to miniature picture screens.

As their input means, known mobile telephones, for example, comprise a plurality of keys and a microphone for user inputs (for entering the telephone number, picking up speech during a call, spoken commands). The output means of known mobile telephones are loudspeakers and a miniature screen.

Known microcomputers, such as PDAs, palmtops, and organizers, normally comprise a keyboard and/or a touch screen as their input means. The output means usually comprise loudspeakers and a miniature screen. Microcomputers comprise a memory and at least one central processing unit that is able to run programs. These include, for example, programs for managing deadlines and appointments (an electronic appointments diary) or programs for managing data (for example addresses), and even computer games.

There are known devices that combine a number of functions. In this way, certain mobile telephones, for example, are also able to play compressed music files.

WO A 01/43473 describes a mobile device that can be used in different operating modes both as a mobile telephone and as a PDA. The device comprises means for registering its arrangement in space and it processes the arrangement in space that is determined or the change in the arrangement in space as a user input. A cursor that is shown on the device moves in accordance with the tilt of the device. By moving the cursor to icons that are displayed and selecting the particular icon by pressing a key, the function assigned to the icon can be selected. In this way, the device can be switched between its modes of operation as a mobile telephone, address database, and computer game.

WO A 01/03054 deals with a further example of a portable electronic device that has means for registering its arrangement in space and that processes the arrangement in space that is determined as a user input. The device is a mobile telephone that detects its arrangement relative to its environment by means of sensors (what are proposed are acceleration sensors, magnetic-field sensors, ultrasonic detection and optical scanning) and controls a cursor shown on the display as a function of the change in its arrangement.

It is an object of the invention to propose an electronic unit that can be operated with particular ease by the user.

This object is achieved by a device as claimed in claim 1 and by a method of controlling a portable electronic device as claimed in claim 10. Dependent claims relate to advantageous embodiments of the invention.

In accordance with the invention, the device is so designed that it can be operated in at least two possible modes of operation, between which the device switches when its arrangement in space is changed.

Different modes of operation are distinguished by the fact that the device performs different functions. In different modes of operation, the device processes different user inputs and/or generates different outputs. A possible first mode of operation is operation as a mobile telephone. A possible second mode of operation is operation as a microcomputer (for example a PDA). A third example is a playing mode for audio and/or video data.

When there are given changes in the arrangement of the device in space, an automatic switch is made between the different modes of operation. What is meant by the arrangement of the device in space is its position and orientation. What is preferably analyzed is, in particular, the orientation of the device, i.e. its rotation about one or more of its three-dimensional axes. The orientation of the device is preferably continuously scanned. As soon as the device assumes a given orientation, i.e. a position within a range defined by a solid angle, the switch to the associated mode takes place. In this case, the modes of operation and

associated orientations are so correlated with one another that operation can be effected by the user intuitively.

In a device that may be used, for example, as a mobile telephone in one mode of operation, an arrangement of the device such as is normal for operating mobile telephones will preferably cause the mobile-telephone mode of operation to be activated. For mobile telephones this means a substantially upright attitude, and the typical attitude adopted when making a telephone call, i.e. slanted at an angle of 20° to 70° to the vertical with the microphone end at the bottom. Where a device is of substantially flat and, for example, elongated form, it will switch automatically to the mobile-telephone mode of operation when in such a position.

Another example of a mode of operation is operation as a microcomputer (PDA, organizer). If the device is positioned in such a way that its display is substantially horizontal, the device will preferably switch automatically to the PDA mode of operation. In the PDA mode, applications such as address database (address book) and appointments diary will be run. Other applications such as word processing, spreadsheets, etc. will be possible.

The device may comprise a large number of other modes of operation for the most multifarious functions. The output unit may, for example, be a rectangular display area. If the device is so oriented that the user sees the display in the landscape orientation, the device will switch to a television mode of operation. If it is oriented in the portrait orientation, an appointments diary mode of operation will be activated. Laying the device down with the display unit facing downwards will result - after a short wait, for example - in the device switching off.

In a further embodiment of the invention, the means present in the device for registering its arrangement in space are also used for the input of parameters, including, in particular, continuous parameters. In this case, the device is switched to the input mode for the input of the parameter by a start-of-input command, such as a spoken command, for example. In the television mode of operation, for example, the spoken command "Volume" could cause the appropriate input mode to be activated. By changing the arrangement of the device in space, the value of the parameter is then changed. The volume may, for example, be raised or lowered by tilting the device to the right or left. The input mode is terminated and the parameter held at the setting reached by an end-of-input command, which is once again preferably a spoken command.

These and other aspects of the invention are apparent from and will be elucidated with reference to the embodiments described hereinafter.

In the drawings:

Fig. 1 is a front elevation of an electronic device in the upright position.

5 Fig.2 is a side elevation of the electronic device of Fig. 1, in the horizontal position.

Fig. 3 is a front elevation of the electronic device of Fig. 1 in a position where it is on its side.

10

An electronic device 10 is shown by way of example in Fig. 1. The device 10 comprises a flat, rectangular housing 12 of a size such that the user can comfortably hold the device 10 in his hand.

15 On the top face of the housing 12 is a screen 14. Loudspeakers 16 are arranged above the screen 14. Below the screen 14, keys 18 are arranged on the right and left and a microphone 20 in the center. An antenna 22 projects from the housing 12.

In the interior of the device 10 (not shown), there is a central processing unit having a plurality of microprocessors that control the functions of the unit 10. The central processing unit processes the inputs from the keys 18 and the signals picked up by the
20 microphone 20. The central processing unit controls the screen 14 and the loudspeakers 16.

The device has sensors to determine its arrangement in space. Sensors of this kind are known per se to those skilled in the art. There are many possible ways of physically implementing the sensors, of which some are discussed in, for example, WO A 01/03054 and WO A 01/43473. The actual form that the sensors take is not crucial to the invention and will
25 therefore not be gone into in detail here.

The spatial arrangement of the device as determined by the sensors is likewise processed by the central processing unit.

The device 10 comprises the requisite functional units to enable it to be used as a mobile telephone, a PDA, and an audio/video player device. The components required
30 for each of these purposes are known per se and do not, therefore, require any detailed elucidation.

In the upright position in which it is shown in Fig.1, the device 10 functions in a mode of operation in which it is operated as a mobile telephone. The user holds the device 10 in such a way that he can speak into the microphone 20 and can hear the output from the

loudspeakers 16. The device is operated, by having telephone numbers keyed in on it, for example via the keys 18, or via the screen 14 if the latter is in the form of a touch pad.

In the mobile-telephone mode, the device 10 accepts speech commands through the microphone 20 (provided there is not a call actively going on on the telephone).

5 In this way, the volume from the loudspeakers, for example, can be changed by activating an input mode by a spoken command "Volume" for this purpose. The volume currently set for the loudspeakers then appears on the screen 14, for example, in the form of a bar chart. By tilting the device slightly to the left from its vertical position, the volume from the loudspeakers is lowered. Accordingly, by tilting it to the right, the volume is raised. Once the
10 volume has reached the desired level, the level reached is held in response to the spoken command "Stop".

Fig. 2 is a side elevation showing the device 10 in a horizontal position. If the position sensors contained in the device report to the central processing unit that the device has been moved to the horizontal position shown in Fig. 2 with the screen facing upwards,
15 the device switches automatically to a PDA mode of operation in which it serves as an electronic appointment diary and address book for the user. The functions a device of this kind performs for these purposes are sufficiently well known and there is, therefore, no need for them to be explained.

Finally, Fig. 3 shows the device 10 in an upright position on its side. If the
20 position sensors detect that the device 10 has been moved to the position shown in Fig. 3, the central processing unit switches the device 10 to an audio/video mode. In this mode, the device 10 reproduces audio data stored in the device or data streams comprising audio and/or video data that are received via the antenna 22. This may, for example, comprise the reproduction of compressed audio files (as with known MP3 players, for example) through
25 the loudspeakers 16. Similarly, a specially dialed-up audio/video signal that is received via the antenna 22, preferably as a data stream, can be shown on the screen 14 and reproduced through the loudspeakers 16.

The switch between the different modes of operation is made automatically by the central processing unit as soon as the particular orientation (see Figs. 1, 2, 3) is assumed.
30 Of course, the orientation assigned to a given mode of operation covers a range in each case, i.e. the orientation assumed need not be the exact orientation specified. Operation as a mobile telephone, for example, will be conceivable at angles of up to 70° to the vertical. To avoid unwanted switches, the switch will preferably not be made until after a short wait. As long as active use is being made of a function, i.e. as long as a telephone call is actually being made

on a device being operated as a mobile telephone, for example, any switching is preferably blocked.

The device 10 shown in Figs. 1 to 3 with its three modes of operation should be considered in this case simply as an example. There are an immense variety of conceivable combinations of devices having two or more different modes of operation. The device may, for example, be a digital camera having an image sensor for taking still and/or moving pictures. In a position normally used for taking pictures (for example upright with the image sensor directed substantially horizontally), the electronic unit is in the picture-taking mode in which pictures or video sequences are taken. In a different position in which the display screen can be viewed, a reproduction mode is automatically activated to allow the pictures and/or video sequences taken to be reproduced.

Another example of different modes of operation is as an address book/appointment diary for different users. If, for example, the device is held in the position shown in Fig.3 where it is on its side with the antenna pointing to the right, it will operate as an address book/appointment diary for a first user. In a position in space in which it is turned through 180° from the position shown in Fig. 3 so that it is on its side with the antenna pointing to the left, it will act as an address book/appointment diary for a second user. The differences between the modes of operation for different users may, for example, be made clear by different background colors.

If analysis of the position sensors shows that the device has been put down with its front face downwards, the central processing unit will switch the device off (after a predetermined wait of, for example, a few seconds).

The invention can be summed up by saying that a portable electronic device and a method of controlling a portable electronic device are described. The electronic device comprises position sensors to enable it to determine its arrangement in space. The device can be operated in different modes of operation such as, for example, a mobile telephone or a PDA. A switch is made between different modes of operation by changing the spatial arrangement of the device, with the upright position, for example, activating the mobile-telephone mode and the horizontal position activating the PDA mode. The switch between different modes of operation by means of a change in orientation allows the user to operate the device intuitively.

CLAIMS:

1. A portable electronic device having
 - at least one control unit and at least one output unit (14, 16) controlled thereby,
 - and means for registering the arrangement of the device (10) in space, the
5 spatial arrangement that is determined being fed to the control unit,
 - wherein the device (10) is so designed that it can be operated in at least two different modes of operation, different user inputs being processed and/or the output unit (14, 16) being differently controlled in the different modes of operation,
 - wherein the device (10) makes a switch between the different modes of
10 operation as a result of a change in its arrangement in space from a first spatial arrangement to a second spatial arrangement.
2. A device as claimed in claim 1, wherein a first mode of operation of the device (10) is operation as a mobile telephone.
15
3. A device as claimed in claim 2, in wherein the device (10) switches to the first mode of operation when it is moved to a substantially vertical position.
4. A device as claimed in any one of the preceding claims, wherein a second
20 mode of operation is as a microcomputer.
5. A device as claimed in claim 4, wherein the device (10) switches to the second mode of operation when it is moved to a substantially horizontal position.
- 25 6. A device as claimed in any one of the preceding claims, wherein one mode of operation of the device is a playback mode in which the device (10) plays audio and/or video data.

7. A device as claimed in claim 6, wherein the device (10) switches to the playback mode when it is moved to a position in which it is on its side.

8. A device as claimed in any one of the preceding claims, wherein the device can be switched to an input mode for the input of a parameter by a start-of-input command, wherein, in the input mode, the value for the parameter is changed depending on how the arrangement of the device (10) in space changes, and wherein the value of the parameter is held by the input of an end-of-input command.

9. A device as claimed in claim 8, wherein the start-of-input and/or end-of-input commands are spoken commands.

10. A method of controlling a portable electronic device,

- wherein the device can be operated in at least two different modes of

operation, in which case it processes different user inputs and/or puts out different signals in the different modes of operation,

- wherein the arrangement of the device (10) in space is determined,

- and wherein the device (10) is switched between different modes of operation by changing the arrangement of the device (10) in space.

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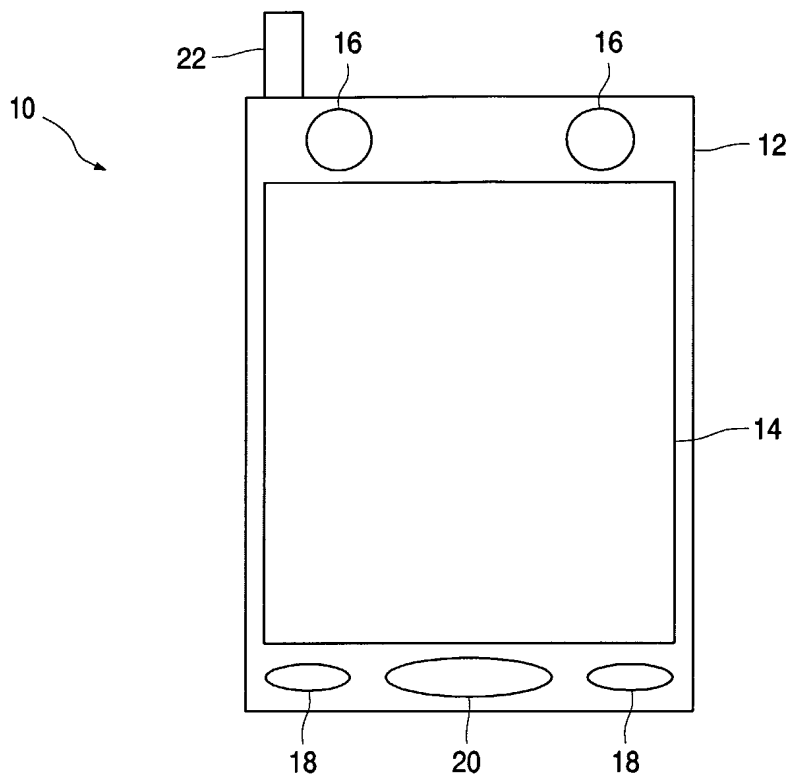


FIG. 1

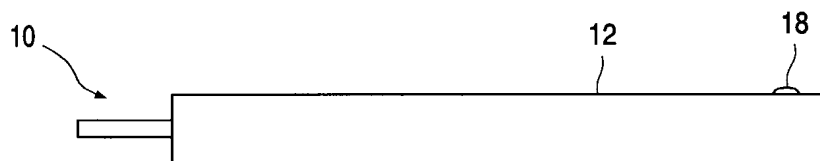


FIG. 2

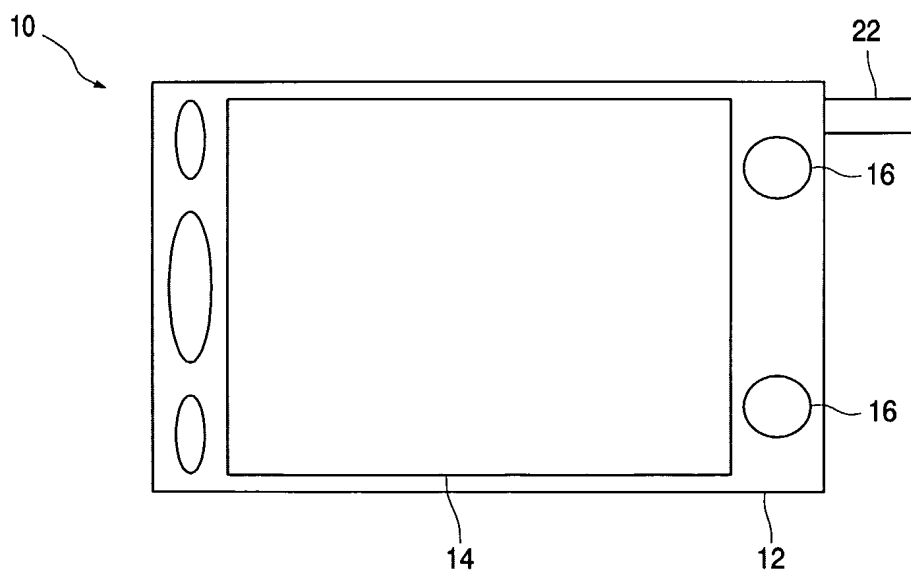


FIG. 3

DERWENT-ACC-NO: 2003-748438

DERWENT-WEEK: 200545

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TITLE: Portable electronic device e.g.
personal digital assistants, has
sensor for determining arrangement
of device in space, and device
switches between different modes
of operation based on spatial
arrangement of device

INVENTOR: SCHRAMM H

PATENT-ASSIGNEE: KONINK PHILIPS ELECTRONICS NV
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PRIORITY-DATA: 2002DE-1011002 (March 13, 2002)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
WO 03077087 A2	September 18, 2003	EN
DE 10211002 A1	September 25, 2003	DE
AU 2003207926 A1	September 22, 2003	EN
JP 2005520232 W	July 7, 2005	JA

DESIGNATED-STATES: AE AG AL AM AT AU AZ BA BB BG
 BR BY BZ CA CH CN CO CR CU CZ
 DE DK DM DZ EC EE ES FI GB GD
 GE GH GM HR HU ID IL IN IS JP
 KE KG KP KR KZ LC LK LR LS LT
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 BE BG CH CY CZ DE DK EA EE ES
 FI FR GB GH GM GR HU IE IT KE
 LS LU MC MW MZ NL OA PT RO SD
 SE SI SK SL SZ TR TZ UG ZM ZW

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
WO2003077087A2	N/A	2003WO- IB00929	March 10, 2003
DE 10211002A1	N/A	2002DE- 1011002	March 13, 2002
AU2003207926A1	N/A	2003AU- 207926	March 10, 2003
JP2005520232W	N/A	2003JP- 575237	March 10, 2003
JP2005520232W	Based on	2003WO- IB00929	March 10, 2003

INT-CL-CURRENT:

TYPE	IPC	DATE
CIPP	G06F3/16	20060101
CIPS	G06F1/16	20060101
CIPS	G06F3/01	20060101
CIPS	H04M1/00	20060101
CIPS	H04N5/44	20060101

ABSTRACTED-PUB-NO: WO 03077087 A2**BASIC-ABSTRACT:**

NOVELTY - The device (10) has a sensor for determining arrangement of the device in space, and the arrangement is fed to a control unit. The device operates in two different modes of operation to process different user inputs, and an output unit is controlled in different modes of operation. The device switches between different modes of operation as a result of a change in its arrangement in space.

DESCRIPTION - An INDEPENDENT CLAIM is also included for a method of controlling a portable electronic device.

USE - Used for managing deadlines, appointments, and computer games.

ADVANTAGE - The device is switched between two different modes of operation by means of a change in position, and hence can be operated intuitively by the user.

DESCRIPTION OF DRAWING(S) - The drawing shows a

front elevation of an electronic device in the upright position.

Portable electronic device (10)

Housing (12)

Screen (14)

Keys (18)

Microphone (20)

CHOSEN-DRAWING: Dwg.1/3

TITLE-TERMS: PORTABLE ELECTRONIC DEVICE PERSON
DIGITAL ASSIST SENSE DETERMINE
ARRANGE SPACE SWITCH MODE OPERATE
BASED

DERWENT-CLASS: T01

EPI-CODES: T01-F05B2; T01-F05G5; T01-M06A1A;

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: 2003-599883